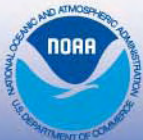


NATIONAL GEODETIC SURVEY

# National Geodetic Survey Orientation

Dave Zilkoski, NGS Director  
January 31, 2006



National Oceanic and Atmospheric Administration

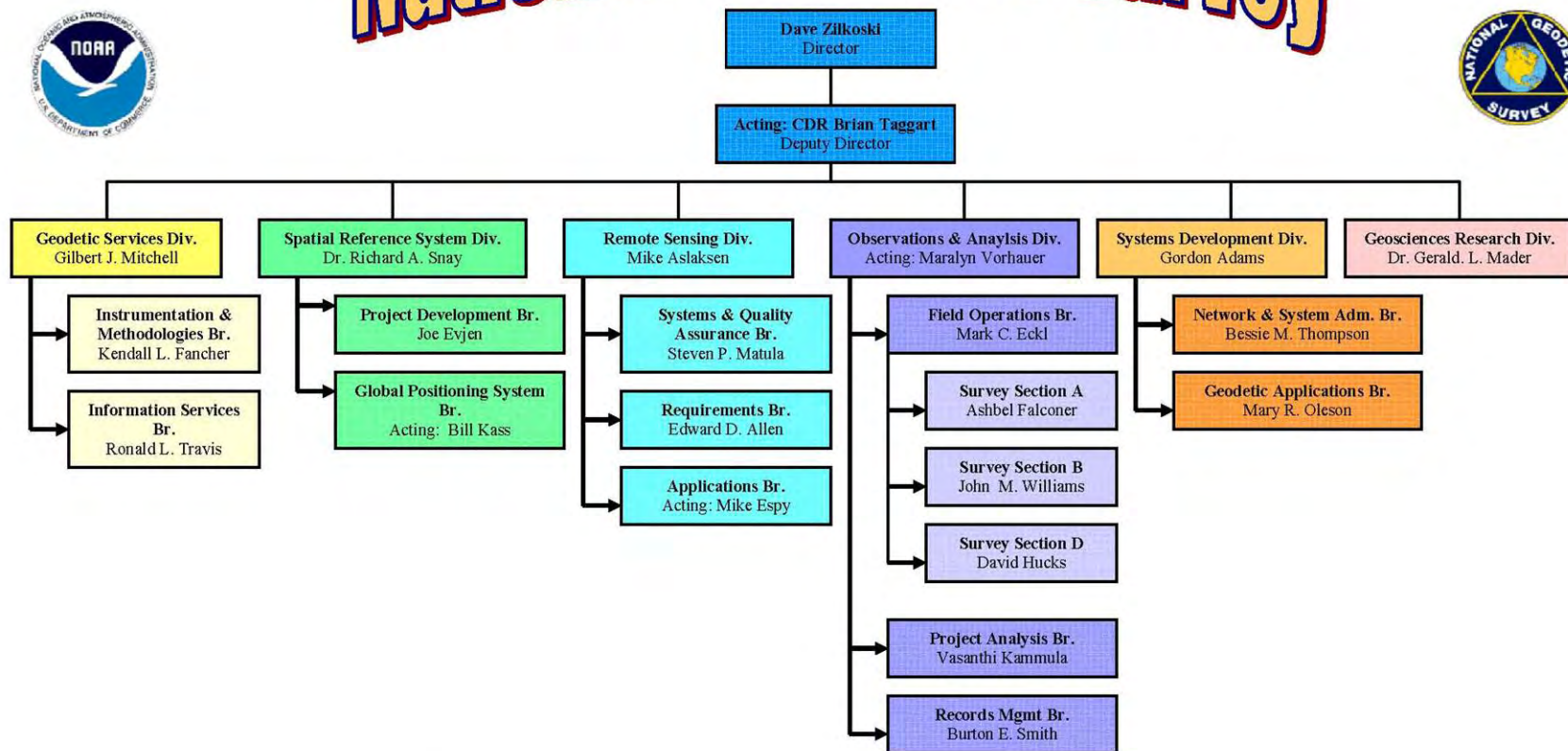
# Outline

- *NGS Structure and Major Programs*
- FY '06 Issues
- Outlook Beyond '06
- External Issues



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# National Geodetic Survey



## NGS Priorities – Program Leaders

**Height Modernization** – Juliana Blackwell

**NSRS Adjustment** – Maralyn Vorhauer

**Coastal Mapping** – Mike Aslaksen

**CORS Enhancement** – Richard Snay

**FAA QA/QC** – Mark Howard

**Specifications, Guidelines and Tools** – Joe Evjen

05/31/05 NSD



**NGS' Vision:**  
**Everyone can know where**  
**he or she is**  
**and where other things are**  
**anytime, anyplace.**



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# NGS Budget

	FY05	FY06	FY07
Geodesy			
President's or <i>projected</i>	\$25.2M	\$24.7M	\$25.2M
Enacted	\$31.4M	\$32.2M	
Shoreline Mapping			
SM line, portion of M&C base, and earmarks	\$7.17M	\$5.7M	
FAA Reimburs.			
	\$8.17	\$4.8	
Total	\$46.74M	\$42.7M	



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# National Spatial Reference System (NSRS)

The NSRS is a consistent coordinate system that defines latitude, longitude, height, scale, gravity, and orientation throughout the United States.



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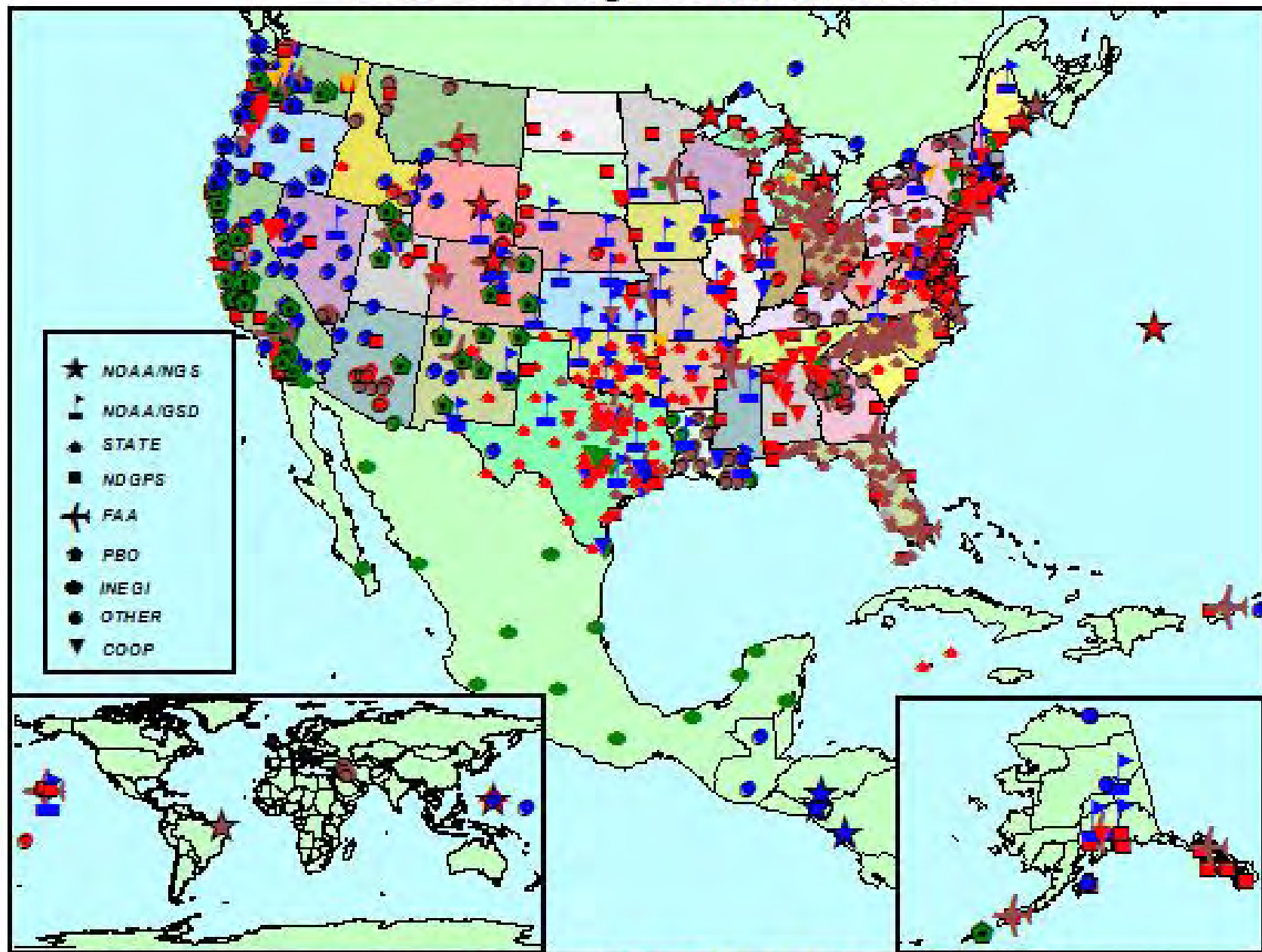
# Continuously Operating Reference Stations (CORS)

- A critical component of land and ocean observing systems
- Provides accurate interface between land and ocean observing systems
- CORS data also used to monitor and predict the distribution of moisture in the atmosphere, improving our ability to predict severe weather events.



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## CORS Coverage - December 2005

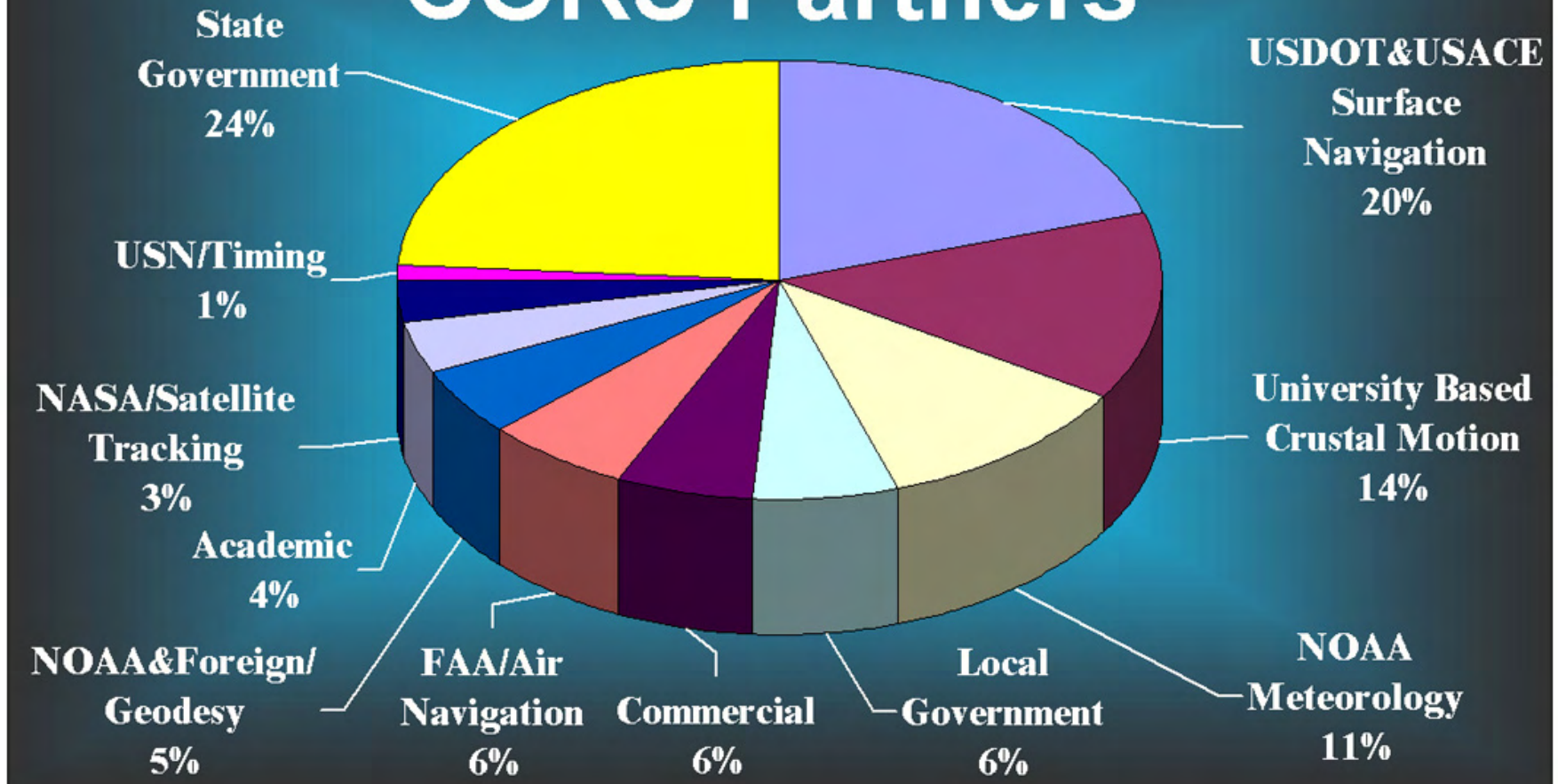


Symbol color denotes sampling rates:(1 sec)(5 sec)(10 sec)(15 sec)(30 sec)(Decommissioned)

Craig 12/15/2005

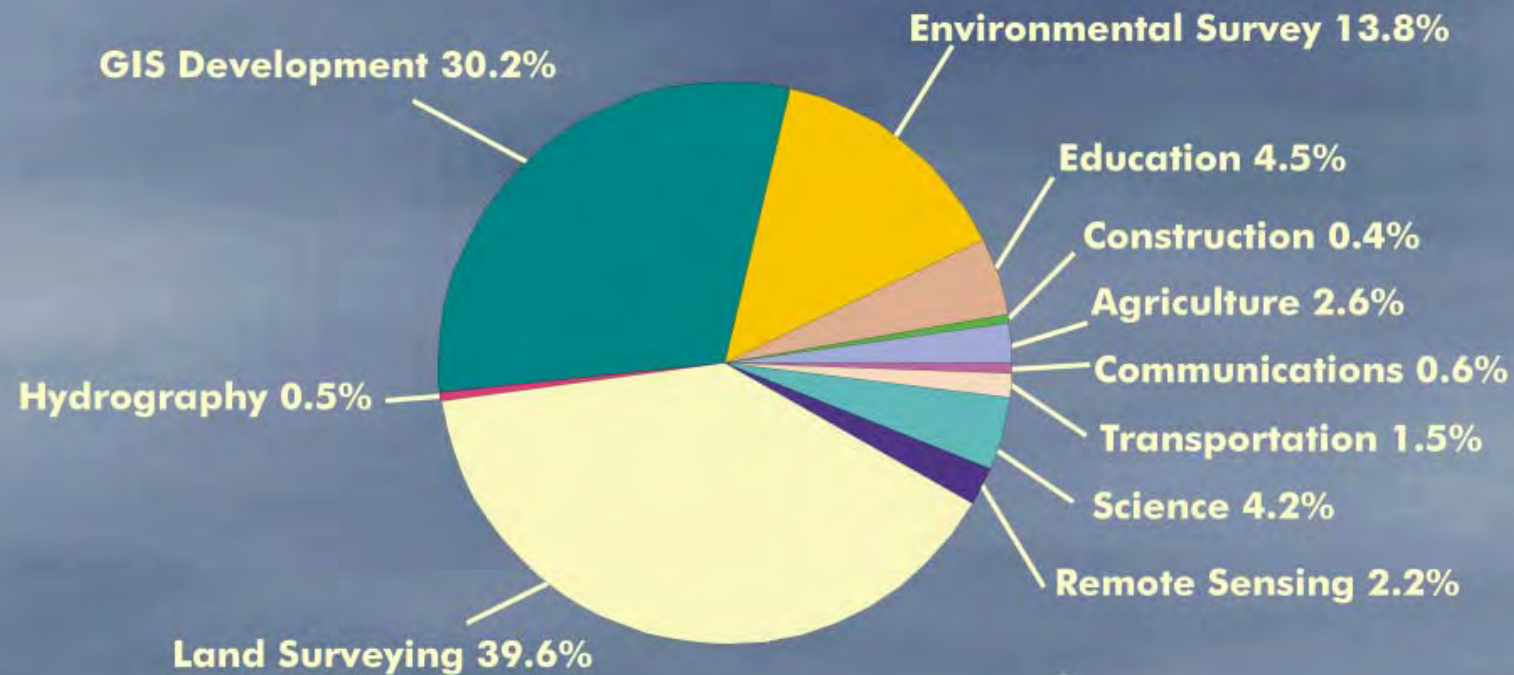


# CORS Partners



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# CORS Applications



5,646  
Survey responses  
Fall 1999



# Online Positioning User Service (OPUS)

- Users submit GPS data to NGS, where they are processed using NGS computers and software.
- The resulting precise positions are e-mailed back to the user.



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# NGS Tool Kit



## NGS Geodetic Tool Kit



on-line interactive computation of geodetic values

See the text version of an [article](#) about the NGS Geodetic Toolkit that appeared in the *Professional Surveyor* magazine, May 2003 Volume 23, Number 4

( [See all the Professional Surveyor Articles about the NGS Geodetic Toolkit](#) )

To learn more about a particular online program, click on its link for a description:

[DEFLEC99](#)

[DYNAMIC HT](#)

[G99SSS](#)

[GEOID99](#)

[GEOID03](#)

[USGG2003](#)

[HTDP](#)

[IGLD85](#)

[Inverse/Forward/Invers3D/Forwrd3D](#)

[LVL DH](#)

[Magnetic Declination](#)

[NADCON](#)

[NAVD 88 Modelled Gravity](#)

[Online Adjustment User Services](#)

[OPUS](#)

[State Plane Coordinates](#)

[Surface Gravity Prediction](#)

[Tidal and Orthometric Elevations](#)

[U.S. National Grid](#)

[Universal Transverse Mercator Coordinates](#)

[VERTCON](#)

[XYZ Coordinate Conversion](#)

OR... Know what you want to do?

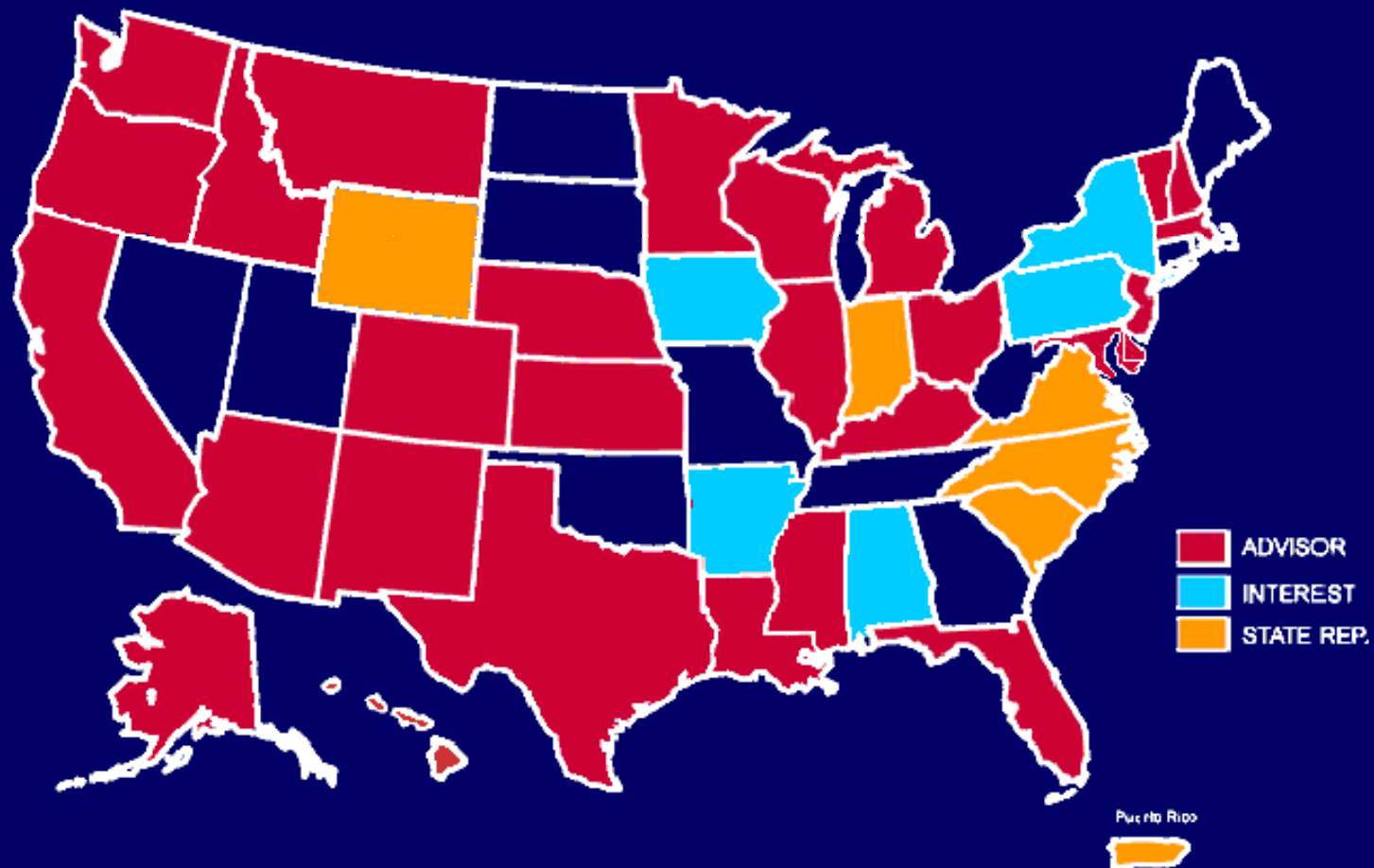
Select a function from this list:

SELECT A TOOLKIT SHORTCUT

For more information contact NGS Information Services:  
by [e-mail](#),  
or call (301) 713-3242, Monday - Friday, 7:00 AM - 4:30 PM eastern time.

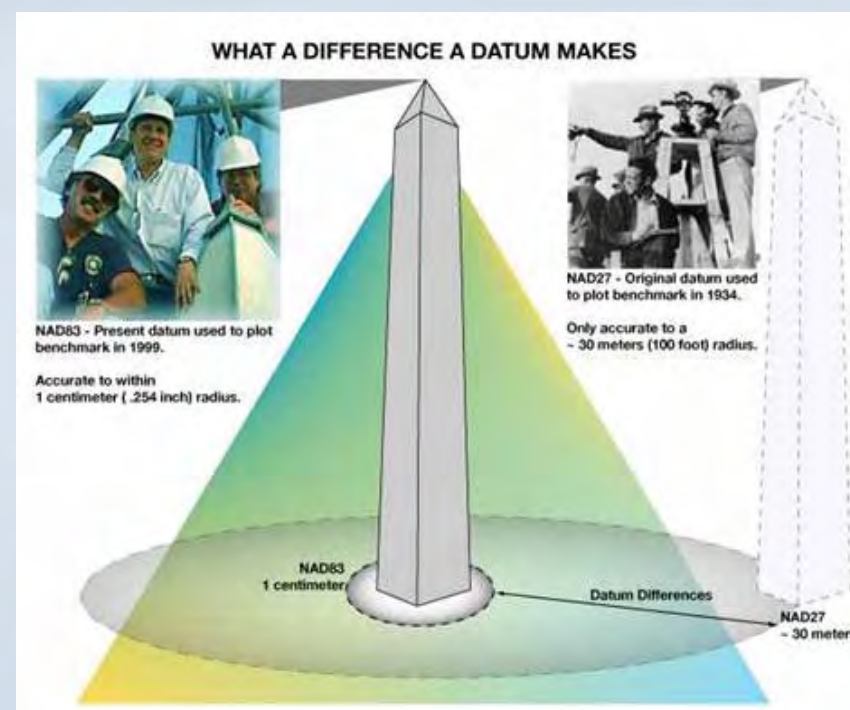
# State Advisor Program

## National Geodetic Survey State Advisors



# National Readjustment

The NSRS Readjustment will resolve coordinate inconsistencies at borders between states. This year NGS loaded into the database all projects submitted for inclusion in the readjustment, including several large networks approaching 1000 stations in size.



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# Surveying for the FAA

Long standing relationship with the FAA to conduct airport surveys.  
Reimbursable program with year-to-year fluctuations in funding and scope of work.



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# FAA Reimbursable Funding

	FY 2004 (\$M)	FY 2005 (\$M)	FY 2006 (\$M) (anticipated funding)
FAA/Airport Obstruction Surveys	\$3.49	\$3.36	\$3.0
FAA/Area Navigation Approach	\$1.06	\$0.0	\$0.0
Wide Area Augmentation Surveys	\$0.0	\$4.81	\$1.8
<b>Total</b>	<b>\$4.55</b>	<b>\$8.17</b>	<b>\$4.8</b>

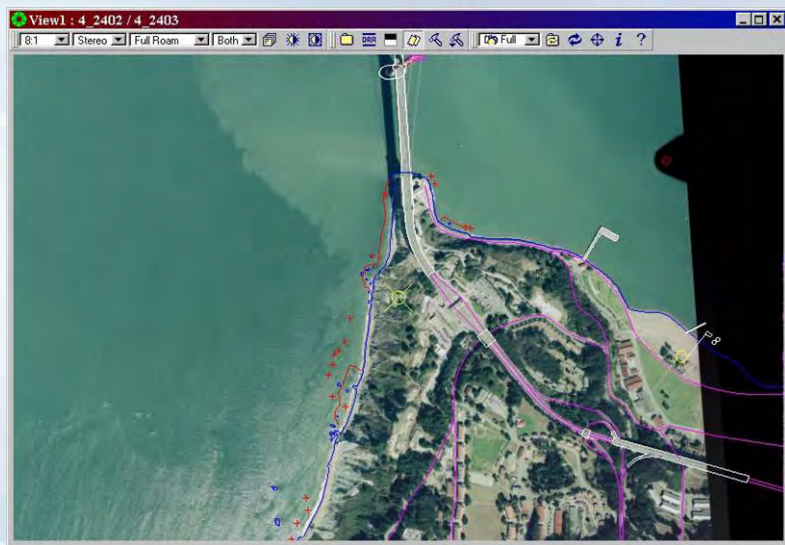


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Approximately 35 employees are paid through FAA funds

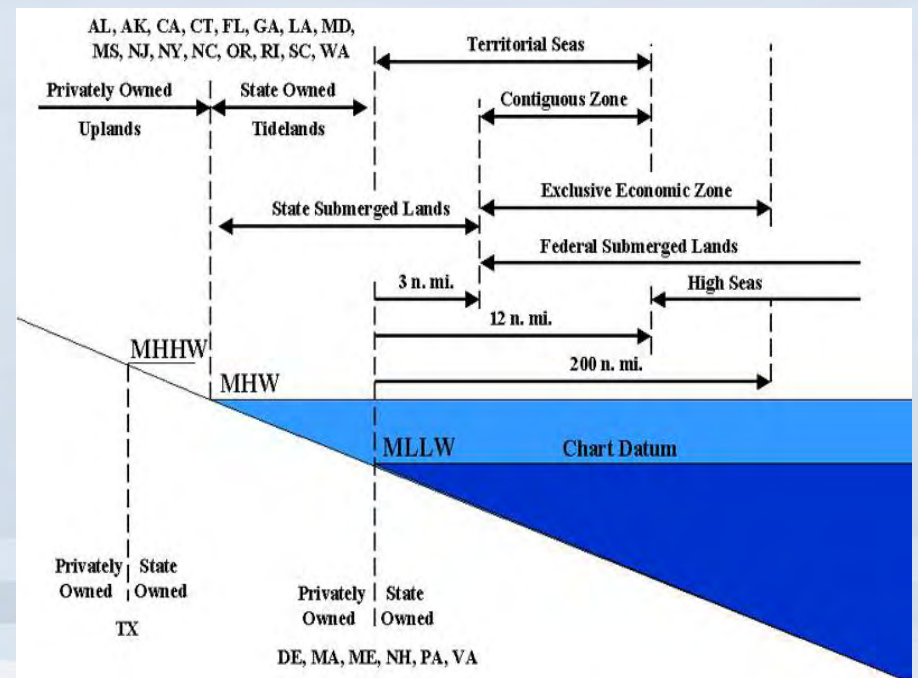
# Shoreline Mapping

- Up-to-date shoreline maps are an integral part of Electronic Navigational Charts
- Shoreline receives funding from Mapping and Charting Base and Shoreline Mapping line item, and occasionally earmarks



# Mapping the Shoreline in San Francisco

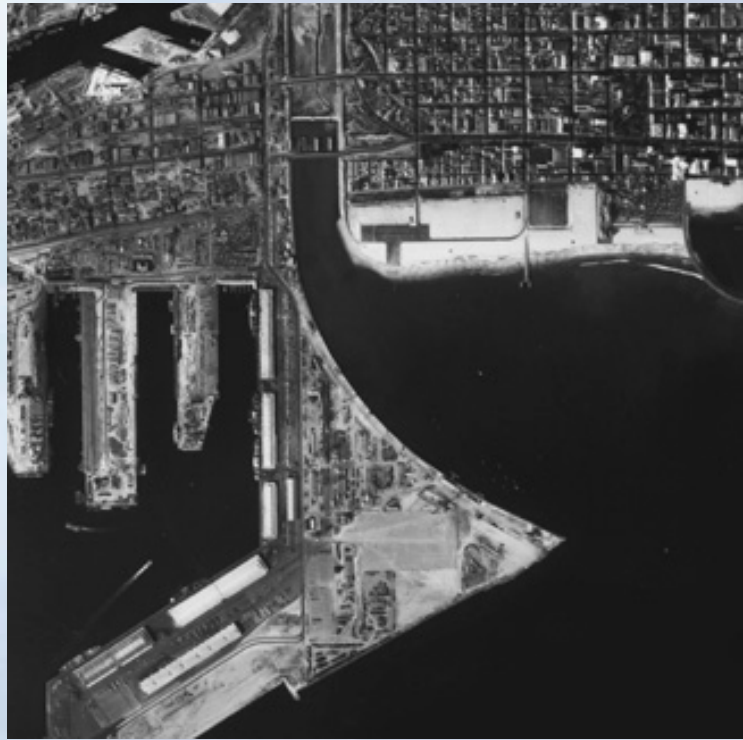
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## Shoreline Legal Issues



# Shorelines Change Continually



1954

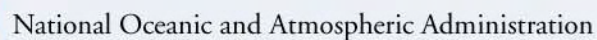


Long Beach, CA 1997



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- Researching new technologies and their applications for remotely sensed shoreline data to NGS & NOAA programs
- V-Datum Partnership with CO-OPS and Coast Survey





# Height Modernization

Used to determine accurate heights using GPS, along with traditional leveling, gravity, and modern remote sensing observations.

Critical for:

- Dam, levee safety
- Evacuation planning
- Hazard mitigation
- Flood-plain mapping
- Subsidence monitoring
- Determining high-water marks



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# Height Mod Appropriations (FY 01-06)

Fiscal Year	Appropriations	States
FY 2001	2.25 M	CA, NC
FY 2002	3.75 M	CA, NC, LA, WI
FY 2003	3.75 M	CA, NC, LA, WI, MS
FY 2004	9.0 M	CA, NC, LA, WI, MS, AL, WA, SC
FY 2005	9.6 M	CA, NC, LA, WI, MS, AL, WA, TX, KY
FY 2006	9.9 M	CA, NC, WI, MS, AL, SC, TX, KY, AZ



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# FY06 Height Modernization Funding

(\$ in thousands)

## BACKGROUND

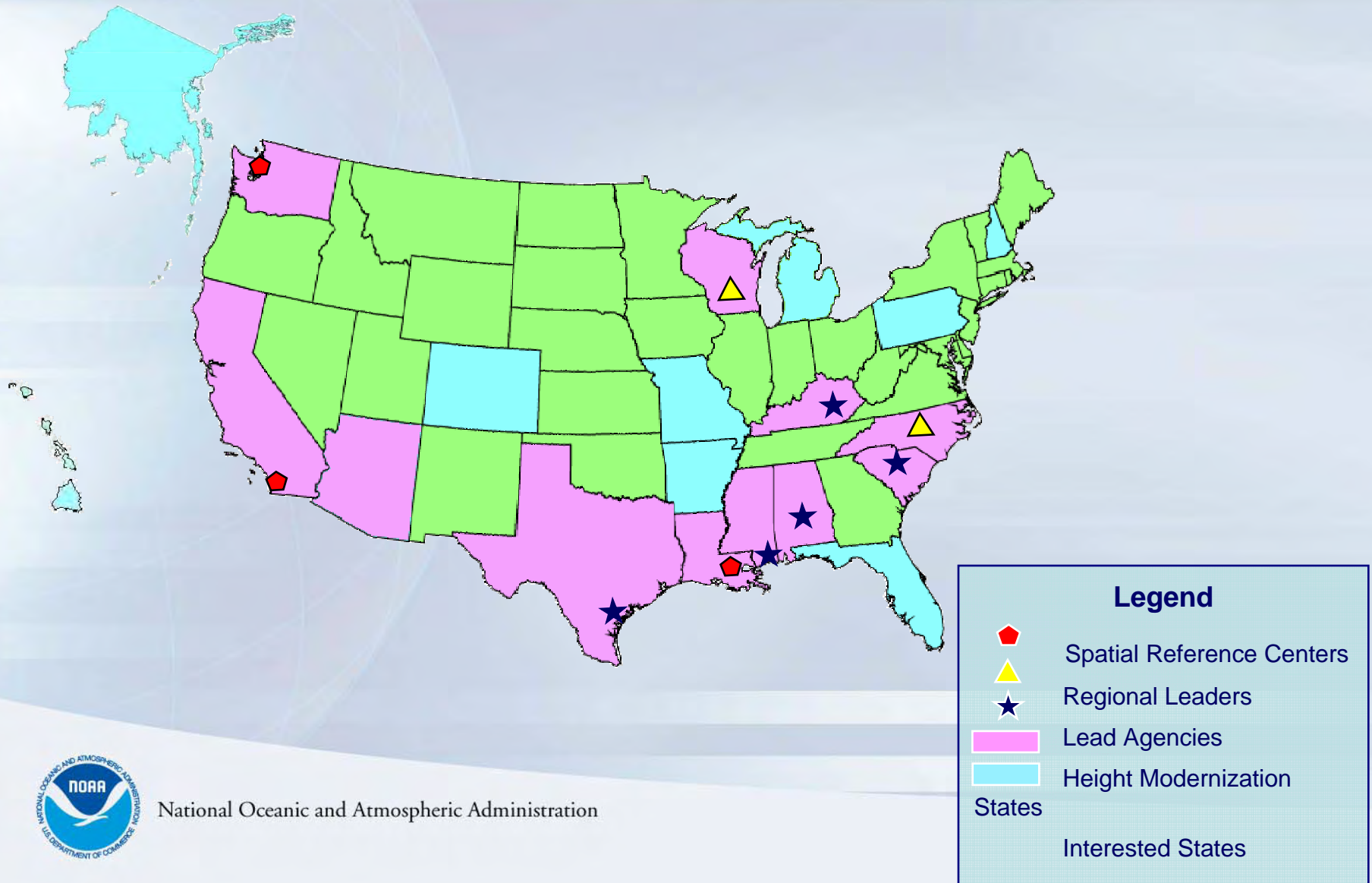
CA	933	California Spatial Reference Center at Scripps Institution of Oceanography
NC	933	North Carolina Department of Environmental and Natural Resources (and North Carolina A&T State University)
WI	3,000	Wisconsin Department of Transportation
AL	1,971	Alabama Department of Revenue
MS	600	University of Southern Mississippi
TX	1,600	Texas A&M University, Corpus Christi
KY	500	Morehead State University
SC	467	South Carolina Geodetic Survey
*AZ	500	???
NGS	233	Height Modernization Regional Expansion - NGS Implementation

\* New state



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# Height Modernization Status



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# Geodetic Research Efforts

- Goal is to reduce the amount of time a surveyor has to 'sit' on a monument, while still achieving highest possible accuracy
  - Utilizing GPS most effectively
- Geoid modeling
- Ionospheric and atmospheric modeling



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# Emergency Preparedness



NGS assists emergency planners in various ways

- Evacuation route surveys
- Accurate heights for measuring sea-level rise, subsidence
- Shoreline maps for safe navigation

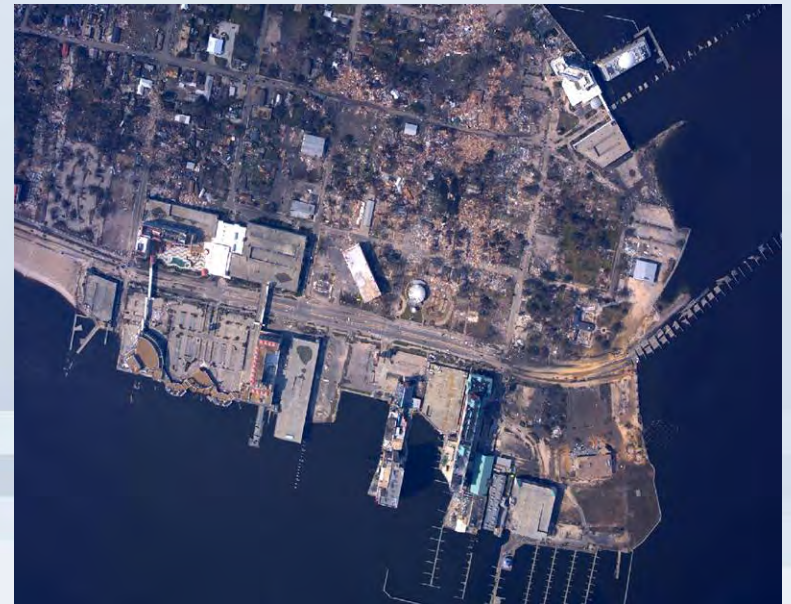


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# Hurricane Response

- NGS' Remote Sensing Division conducted damage assessment flights immediately following the landfall of Katrina, Rita, and other hurricanes
- For Katrina, NGS collected more than 8,300 images over 1,600 miles of linear flight lines
  - Website received over 72 million hits, and users have downloaded over 51 million image files
- Google Earth and other Web services incorporated the imagery.
- Insurance adjusters used the imagery to help process claims.
- CORS was operating in the area affected by Katrina, and collected data to support remote sensing missions and other GPS applications such as surveying and mapping activities associated with the post-hurricane recovery work.



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# Major Requirements Drivers

- Coast and Geodetic Survey Act, Public Law 80-373, Title 33 U.S. Code 883a, 1947.
- The Hydrographic Services Improvement Act of 1998, Public Law 107-372 reauthorized December 19, 2002.
- Establishment of Nationwide Differential Global Positioning System (NDGPS), Public Law. 105-66, title III, Sec. 346, 1997, 111 Stat.1449.
- Office of Management and Budget (OMB) Circular No. A-16 Revised, August 19, 2002 Coordination of Geographic Information and Related Spatial Data Activities.
- 2001 Federal Radionavigation Plan, U.S. Departments of Transportation and Defense, December, 2001.
- National Height Modernization Study, Report to Congress, June 1998.
- 2001 Federal Radionavigation Plan, U.S. Departments of Transportation and Defense, December, 2001.
- Aviation System Standards (AVN) Agreement and the Air Traffic Information Services (ATA-100) Agreement.



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# Outline

- NGS Structure and Major Programs
- *FY '06 Issues*
- Outlook Beyond '06
- External Issues



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# Major Deliverables

1. The National Spatial Reference System
2. Definition of the National Shoreline
3. Surveys and QA/QC for FAA Airport Charts

A sampling of specific milestones follows



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# Major Deliverables: NSRS

- 34.0% of U.S. counties rated as fully enabled or substantially enabled with accurate positioning capacity by FY '06 Year End
- Publish new CORS Guidelines (completed 1<sup>st</sup> Quarter)
- OPUS-DB available to the public by end of 2<sup>nd</sup> Quarter
- Outreach through at least 10 Height Modernization Events (User Forums, workshops, meetings, etc.) in FY '06
- Award grants and work for 7 states for Geodetic Survey and Height Modernization efforts in FY '06



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# Major Deliverables: Shoreline Mapping

- Critical Shoreline Areas:
  - 100% defined on 5 year rolling basis
  - 27.5% will be defined in FY '06
- Rest of U.S. shoreline:
  - 4.4% will be defined in FY '06



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# Major Deliverables: FAA

- 150 Area Navigation Approach LPV obstruction surveys planned for FY '06
- 41 Airport Obstruction Chart surveys planned for FY '06



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# NGS In the PPBES Structure

- All of NGS is within the Commerce and Transportation Goal
- NGS contains the Geodesy Program entirely, and the Shoreline Mapping component of the MTS Program
- Not directly involved with any Councils



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# FY 06 Congressional Budget

- 7 Height Mod earmarks
  - Recipient of AZ grant still unknown
- No cuts outside of rescissions and decreases to support other NOS programs
- Base funds have been relatively stagnant for years



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# Congressional Issues

## Height Modernization

- This program would be more effectively run on a National basis
  - Earmarks not efficient, but show desire by states to have updated elevations
- National Height Mod plan exists, but have not gained support for this within the Goal



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# Congressional Issues

## Shoreline Mapping

- Recent large increases to address the hydro-survey backlog have not been matched by increases to fund the shoreline mapping backlog.
  - Lack of understanding that these surveys are closely linked, and outdated shoreline information poses hazards to the nation's commerce, transportation, and recreational boating sectors
- Shoreline mapping in the past has received earmarks for work in the Chesapeake Bay, but did not in FY 2006

## FAA

- Program would be run more efficiently if funds came directly to NGS rather than reimbursed through the FAA – would require Congress working across Committees



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# Reauthorized Legislation

- Work with NOS/NOAA to begin work on reauthorization of HSI A for FY 2008 and beyond



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# Metric with NOAA Attention

## Geodesy GPRA Measure

- First year of implementation – a more customer focused outcome measure
- Measures the percentage of U.S. counties rated as fully enabled or substantially enabled with accurate positioning capacity
  - Goal: Increase percentage of counties rated as substantially or fully enabled from 25% in 2004 to 90% in 2011).
- Accurate positioning measured on a county by county level using OPUS, OPUS DB, accepted blue book data (GPS and Leveling projects), and completion of County Scorecard.



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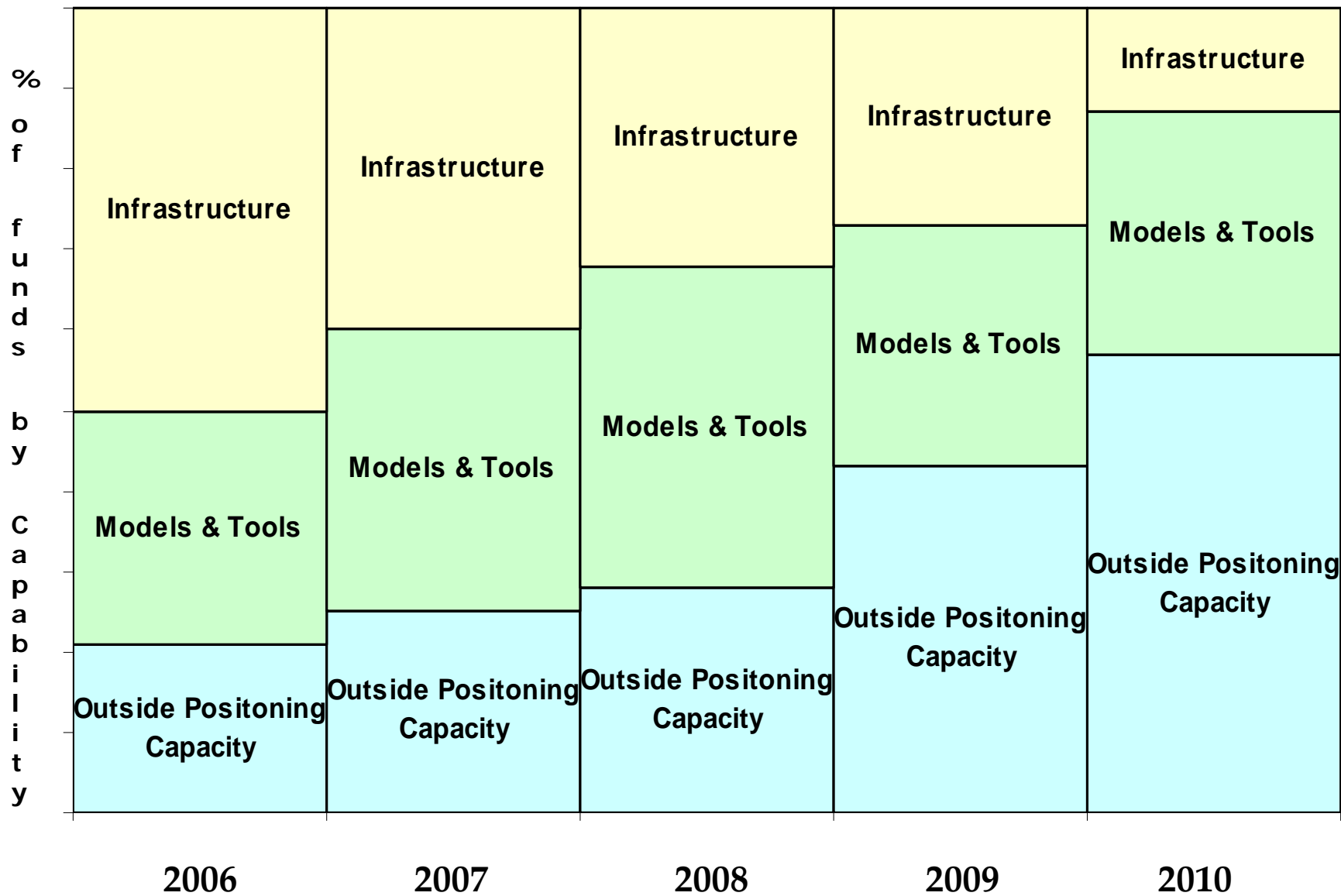


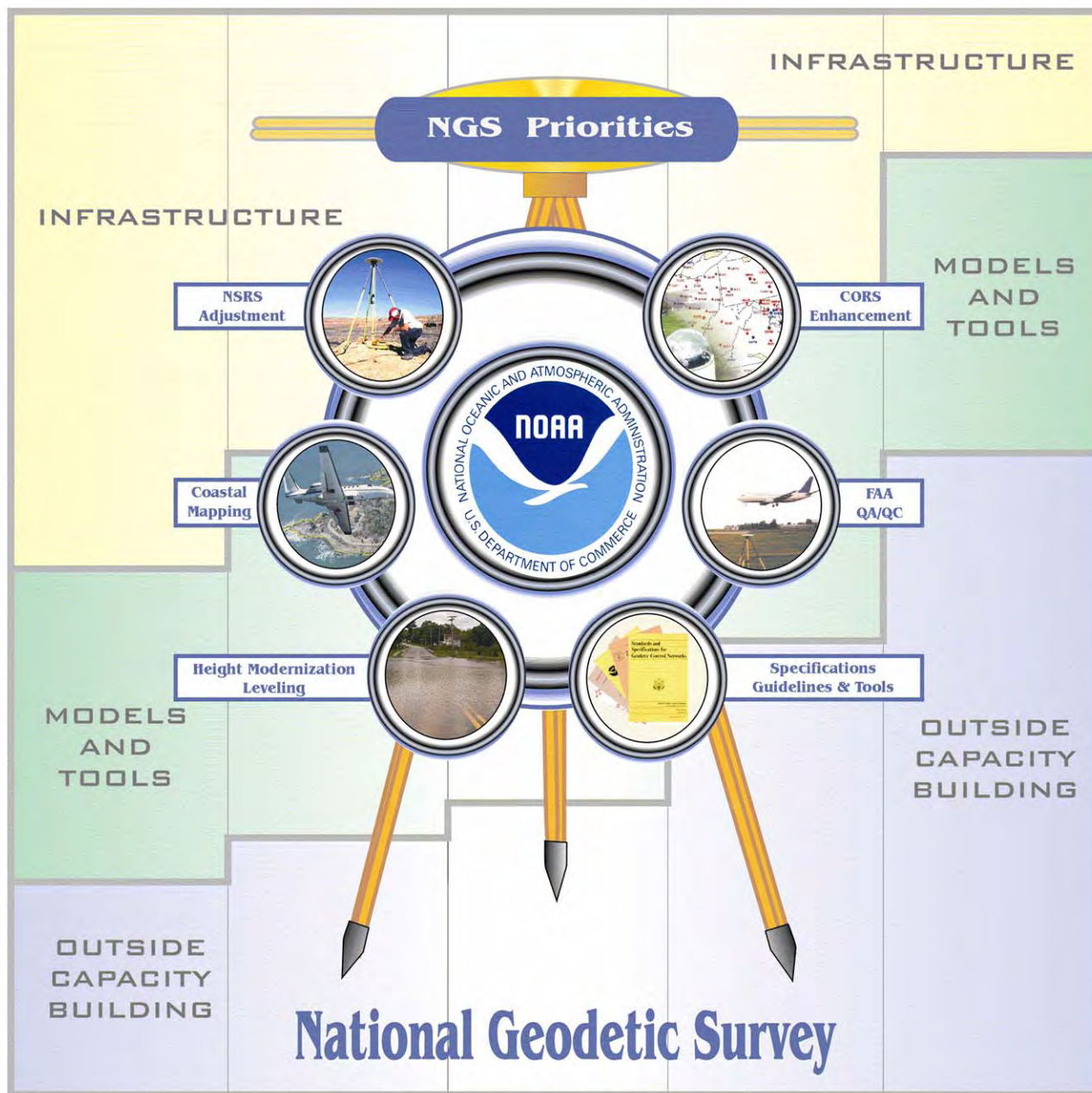
# Outline

- NGS Structure and Major Programs
- FY '06 Issues
- *Outlook Beyond '06*
- External Issues



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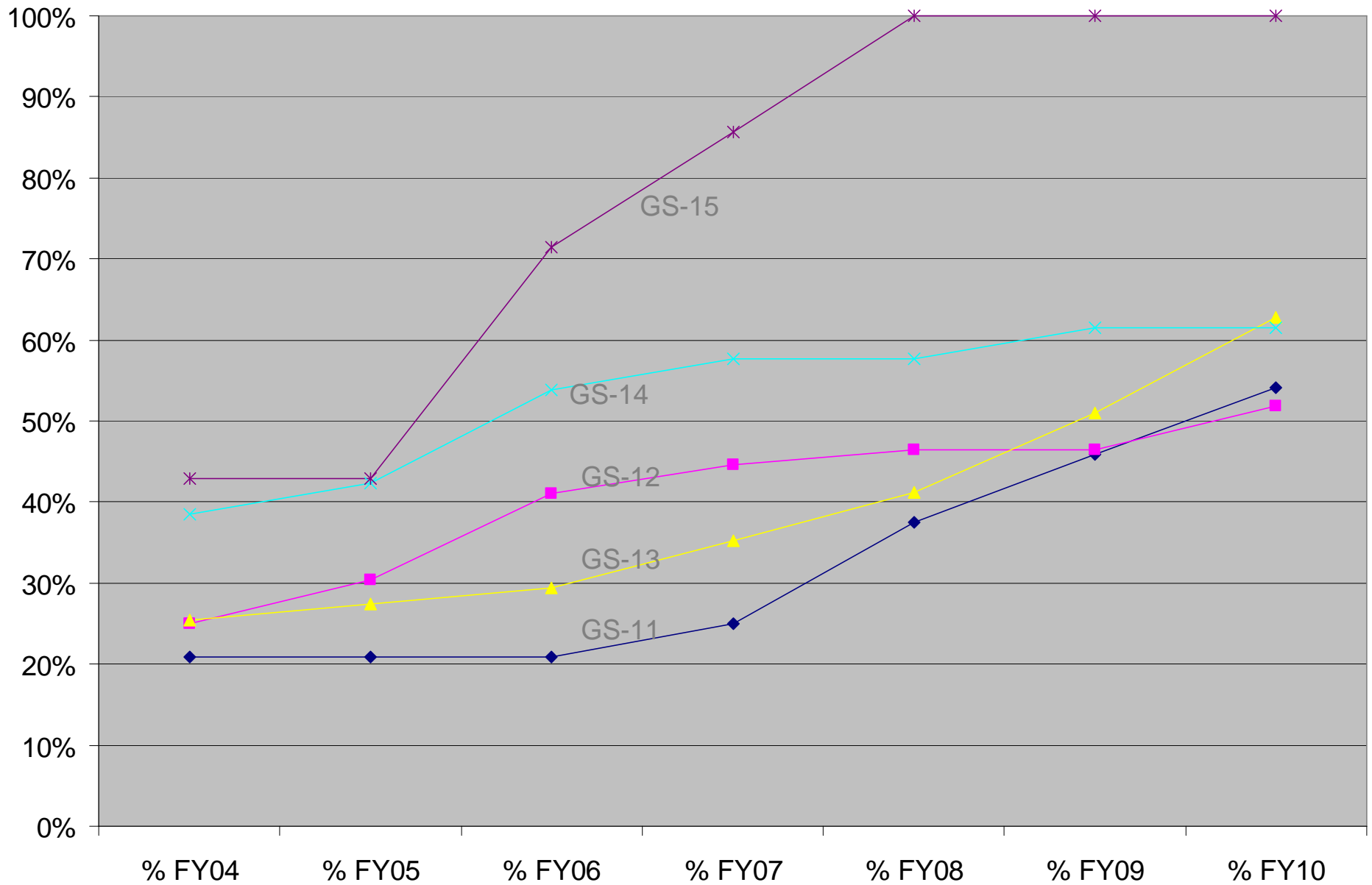
# Staffing Issues

- Large percentage of employees at or nearing retirement age
  - How to keep expertise in the agency, retain core competencies
- Evaluating best methods for attracting the best and brightest new employees



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## Retirement Eligibility by Grade level



# Outline

- NGS Structure and Major Programs
- FY '06 Issues
- Outlook Beyond '06
- *External Issues*



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# Stakeholders with Established Relationships

- Surveyors/Surveying Community
- State DOTs
- American Congress on Surveying and Mapping/National Association of Counties
  - Continued outreach to these groups, which are currently providing us a needs assessment of our Models and Tools via the County Scorecard.
- American Society of Photogrammetry and Remote Sensing
- American Geophysical Union
- International GNSS Service



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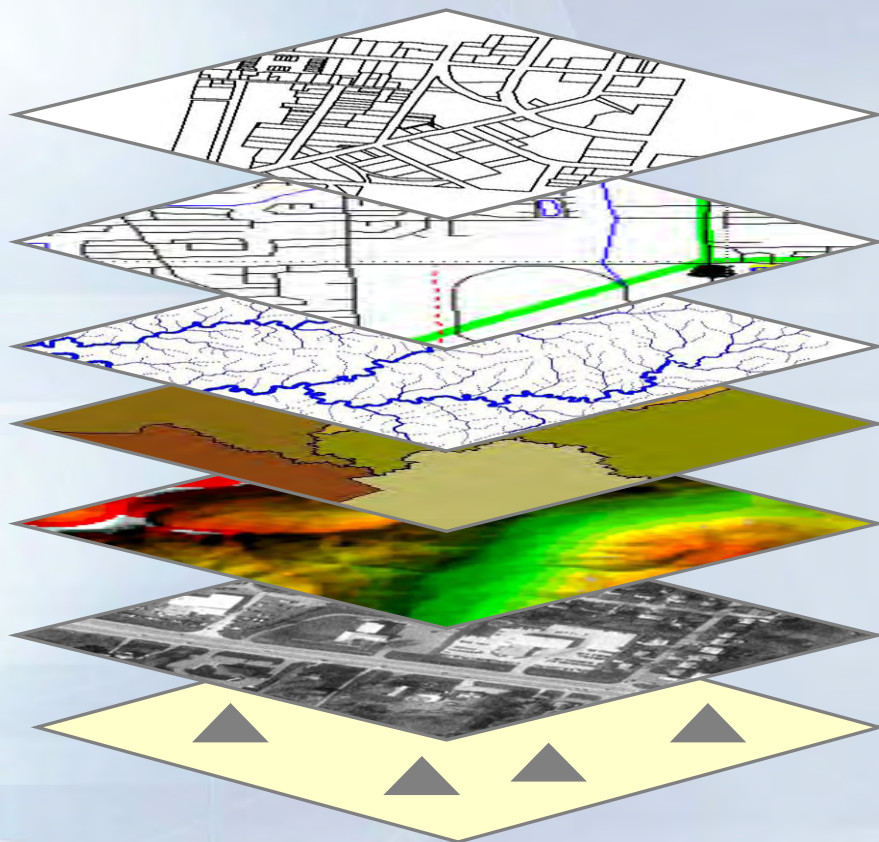
# Stakeholder Targets for Outreach/Improved Communications

- GIS Community
  - Burgeoning sector –we are still exploring how to best support this broad group of users and make them aware of our products and services
- Coastal managers
  - How they can best utilize NGS Products and Services, from Height Mod to Shoreline Mapping
- FAA: Aeronautical Survey Program:
  - Outreach within NOAA and FAA as to more efficient ways to administer this program



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# Critical Layer of GIS Applications



Land Ownership

Transportation

Surface Waters

Boundaries

Elevation

Aerial Imagery

**Geodetic Control**



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# Upcoming Activities for AA Participation

- Corbin, VA Facility 50<sup>th</sup> Anniversary and transfer of property to NOAA from USGS – May 23, 2006
- NGS Leadership Summit – Summer/Fall 2006
- ACSM Conference – April 2006
- EZRI Survey Summit – August 2006
- Lewis and Clark Commemoration, Final Event, St. Louis MO – September 2006.



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# Cooperative Efforts

- Office of Coast Survey
  - Shoreline Mapping data critical for Nautical Charts
- CO-OPS
  - CORS on tide gauges
  - Wetland restoration projects
- OAR
  - Water Vapor data from CORS supports weather forecasting
- FEMA/Army Corps of Engineers
  - Map Modernization
  - Various efforts at establishing accurate heights in the Gulf Coast



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# Cooperative Efforts (cont'd)

- NESDIS
  - Continuity of Operations back-up and parallel CORS system at Boulder facility
- FAA
  - Long-standing agreements to conduct airport surveys – evolving relationship, perhaps in future will be providing strictly QA/QC
- States – approximately 34
  - State advisor program
  - Height Mod program
- Federal Geographic Data Committee (FGDC)



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# NGS Culture

- Extremely skilled and dedicated employees
  - Proud of heritage dating back to Thomas Jefferson
- Since the split of the Coast and Geodetic Survey and the creation of NOS, many employees feel a disconnect between NGS and other parts of NOS
- Challenging to have Director's and Deputy Director's attention elsewhere
  - Goal Team Lead, Acting AA, NOS Technical Director, IOOS Program Manager
- NGS is the common denominator in many NOAA activities; integrates positioning and integrates services



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